

Remarks

Claims 18-28 presently appear in this case. Claims 18-28 were rejected.

The changes to the Specification were to amend the Abstract, the Title, and the priority reference. No new matter was added as a result of this Amendment.

Rejection of Claims 18, 25-26 and 28 under 35 U.S.C. 102(b) as being anticipated by Haluska et al.

The Examiner states that Haluska (hereafter '249) teaches "providing a solution comprising an alkoxide precursor (the product of (c) below) and a dopant precursor" "mixing said solution with a solid particle precursor" "inducing a sol-gel condensation reaction to form a sol-gel condensation reaction mixture" "spreading the sol-gel mixture on a substrate" "drying the sol-gel reaction mixture" "producing a desired thickness of film" and "heating the thick film".

Applicants respectfully disagree and put forth the following traversal.

The '249 patent "relates to luminescent coatings formed from hydrogen silsesquioxane resin and phosphor fillers". (Col.1, lines 7-9) In other words, the starting materials are a resin and a phosphor.

Applicants' starting materials are an alkoxide precursor, a dopant precursor, and a solid particle precursor. These materials are then reacted to form a sol-gel condensation reaction mixture that now includes phosphor. Nonetheless, applicants again note that the phosphor

concerned in the '249 patent is neither a reactant nor a product. Rather, the phosphor simply becomes encased in a ceramic coating. In contrast, the phosphor of the present application is a reaction product via a sol-gel reaction.

In the '249 patent, the "expression 'filler' is used to describe a finely divided solid phase which is distributed within the resin and the final ceramic coating." (Col.2, lines 7-9) The '249 patent is a coating formed by "applying a coating composition comprising hydrogen silsesquioxane resin and a phosphor filler." (Col. 2, lines 22-23) Applicants are claiming a method whereby the phosphor is formed during a reaction within the steps of preparing the film. The distinction is further emphasized in the '249 patent by the statement that "[t]he preferred fillers to be used herein are phosphors." (Col. 3, line 66) The present invention concerns only phosphors, as phosphors are the products obtained from reacting the starting materials of the present application.

Applicants respectfully suggest that if the '249 patent involves a sol-gel reaction, it is a sol-gel reaction to form a ceramic, not to form the phosphors, as in the present application. First, as stated above, phosphors in the '249 patent are used as being already in the solid phase, not formed by the reaction. The '249 patent involves mixing a resin and a filler or encasing already made phosphor particles, not forming a phosphor, as in the present application. In the present application, the phosphor is formed in the last step. In the present application, the encased silica particles react in a solid reaction with the metallo-alkoxide lattice to form the silicate phosphor material.

Applicants have studied the citation for the sol-gel reaction (Col. 2, lines 35-38) as cited by the Examiner. Applicants understand this citation to be a mere recitation of possible types of resins that can be used in the resin and filler combination. The beginning of the paragraph that contains this citation states that “[t]he hydrogen silsesquioxane resins (H-resin) which may be used in this invention include...” (Col. 2, lines 26-27) The next sentence begins “[e]xamples of R include...” (Col.2, line 32) The next sentence, the Examiner’s citation, begins “[a]s such, these resins may be fully condensed...or they may be only partially hydrolyzed...and/or partially condensed...” (Col. 2, lines 34-37) (The remaining portion of the Examiner’s citation, line 37-38, is “[a]lthough not represented by this structure, these resins may contain a small”)

Therefore, Applicants respectfully suggest that the anticipation rejection fails.

It has long been held that, to avoid anticipation and satisfy the novelty requirement, only the slightest degree of difference must exist between that which is sought to be patented and the prior art. (*E.I. du Pont de Nemours and Co. v. Polaroid Graphics Imaging, Inc.* 706 F.Supp. 1135, 1142, 10 U.S.P.Q.2d (BNA) 1579, 1585) Thus, it has been said that novelty has been called a fairly liberal test of patentability. (*Plastic Container Corp. v. Continental Plastics of Oklahoma, Inc.* 708 F.2d 1554, 1560 219 U.S.P.Q. (BNA) 26,30)

Applicants understand that a sol-gel reaction involves the hydrolysis of an metal alkoxide (an organometallic compound) followed by a condensation reaction between the hydrolyzed product molecule and the parent alkoxide to eliminate an alcohol molecule to form a polymeric alkoxy-metal oxide material (gel). Or the condensation can be between two hydrolyzed product

molecules to eliminate a water molecule to form the same alkoxy-metal oxide material. The firing of this polymer material gets rid of the organic parts and water and yields a metal oxide ceramic compound. Applicants respectfully suggest that the '249 patent involves a hydrogen silsesquioxane resin with a formula resembling a partially hydrolyzed or partially condensed polymer resulting from, at best, an incomplete sol gel reaction. Nonetheless, applicants again note that the phosphor concerned in the '249 patent is neither a reactant nor a product. Rather, the phosphor simply becomes encased in a ceramic coating. In contrast, the phosphor of the present application is a reaction product via a sol-gel reaction.

Novelty requires that every element of the asserted claim exists in a single prior art reference, or that the claimed invention was previously known or embodied in a single prior art device. This standard is not satisfied where the prior art reference merely discloses the "concept," "essence," "key," or "gist" of the patented invention; "concepts do not anticipate." (Panduit Corp. v. Dennison Mfg. Co., 774 F.2d 1082, 1101, 227 U.S.P.Q. (BNA) 337, 350)

Moreover, anticipation cannot be predicated on teachings in a reference that are vague or based on conjecture." (Datascope Corp. v. SMEC, Inc., 594 F. Supp. 1303, 224 U.S.P.Q. (BNA) 694 698)

In conclusion, because Claims 18, 25-26 and 28 all involve phosphor as a reaction product via a sol-gel reaction and because this was not taught in the '249 patent, the anticipation rejection fails.

Rejection of Claims 18-21, 23-26, and 28 under 35 U.S.C. 103(a) as being unpatentable over Haluska et al. and Levene in view of each other

The Examiner begins the obviousness rejection by stating “‘249 is described above.” The Examiner continues by stating that ‘249 “teaches the formation of a sol-gel reaction mixture”.

As previously noted, Applicants respectfully suggest that the ‘249 patent does not teach a sol-gel reaction in which a phosphor is formed, as in the present application. Rather, the ‘249 patent merely states various acceptable conditions for the resins - condensed or partially hydrolized and/or partially condensed, which may have resulted from a sol-gel reaction. The sol-gel reaction of the ‘249 patent simply encases ready made phosphor particles. Applicants have studied the citation by the Examiner as well as the complete patent.

Because the ‘249 patent does not teach a sol-gel reaction in which a phosphor is formed, any attempt to combine this reference with another reference concerning further teachings about the sol-gel reaction must also fail.

At most, this may make it “obvious to try” to use this sol-gel reaction to form a phosphor, however, it has long been held that “obvious to try” is not the standard under 35 U.S.C. 103(a). (Ex parte Argabright, 1512 U.S.P.Q. 703, Bd. Of Appls. 1967; In re Goodwin, 576 F.2d 375, 198 U.S.P.Q. 1 (C.C.P.A 1978)) Applicants respectfully submit that patentability considerations based on “obvious to try” logic are contrary to 35 U.S.C. 103. (In re Tomlinson, 363 F.2d 928, 150 U.S.P.Q. 623 (C.C.P.A. 1966)) Moreover, there is no cited reference in the prior art of record to show or even suggest the modification necessary to achieve the presently-claimed

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invention and hence, there is no basis for the Examiner's apparent assertion that said substitution would be prima facie obvious. (In re Grabiak, 769 F.2d 729, 226 U.S.P.Q. 1125 (Fed. Cir. 1985))

Therefore, Applicants respectfully suggest the Examiner has failed to put forth a prima facie case of obviousness.

In conclusion, because Claims 18-21, 23-26, and 28 all involve phosphor as a reaction product via a sol-gel reaction and because this was not taught in the '249 patent, the obviousness rejection fails.

Rejection of Claim 22 under 35 U.S.C. 103(a) as being unpatentable over Haluska et al. and Levene in view of each other and further in view of Kilian et al.

The Examiner continues the obviousness rejection by stating that "'249 and '224 are discussed above."

Again, the Examiner relies on the statement that the '249 patent teaches a sol-gel reaction. As stated, Applicants respectfully disagree. The '249 patent involves a mixing of a resin and a filler, not a reaction to form a phosphor.

Because the '249 patent does not teach a sol-gel reaction in which a phosphor is formed, as in the present application, any attempt to combine this reference with another reference concerning further teachings about the sol-gel reaction must also fail.

Applicants also respectfully submit that the mere fact the prior art could be so modified would not have made the modifications obvious unless the prior art suggested the desirability of the modification. (In re Gordon, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984)) There must have been, at the time of the invention, a reasonable expectation of success. This was not the case with the present invention. The prior art references do not supply the teaching necessary to insure the success of the combination as stated by the Examiner. The invention that was made does not make itself obvious; that suggestion or teaching must come from the prior art. (C.R. Bard Inc. v. M3 Systems Inc., 48 U.S.P.Q. 2d 1225, 1232)

In conclusion, because Claim 22 involves phosphor as a reaction product via a sol-gel reaction and because this was not taught in the '249 patent, the obviousness rejection fails.

Rejection of Claims 27 under 35 U.S.C. 103(a) as being unpatentable over Haluska et al. and Levene in view of each other and further in view of Francis et al.

The Examiner continues the obviousness rejection by stating that "'249 and '224 are discussed above." The Examiner then states "'249 teaches that the sol-gel condensation reaction may include other fillers besides the phosphor filler."

Again, the Examiner relies on the statement that the '249 patent teaches a sol-gel reaction. As stated, Applicants respectfully disagree. The '249 patent involves a mixing of a resin and a filler, not a sol-gel reaction to form a phosphor, as in the present application.

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Because the '249 patent does not teach a sol-gel reaction in which a phosphor is formed, any attempt to combine this reference with another reference concerning further teachings about the sol-gel reaction must also fail.

Applicants respectfully submit that focusing on individual elements of the claimed invention, rather than on the invention as a whole, is not the proper test under 35 U.S.C. 103. (In re McLaughlin, 443 F.2d 1392, 1395, 170 U.S.P.Q. 209, 212 (1971); Connell v. Sears, Roebuck & Co., 772 F.2d 1542, 1549, 220 U.S.P.Q. 193, 199 (Fed. Cir. 1983)) Therefore the Examiner's statement that "it would be obvious to..." does not afford the Applicants the proper test under 35 U.S.C. 103.

In conclusion, because Claim 27 involves phosphor as a reaction product via a sol-gel reaction and because this was not taught in the '249 patent, the obviousness rejection fails.

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Conclusion

In conclusion, Applicants respectfully submit that the Examiner's Office Action has been fully responded to. If a personal or telephone interview would help expedite the prosecution of this application, the Examiner is requested to contact Steve Hunnius at 202-404-1558.

No issue of new matter or lack of adequate written description should arise as a result of the entry of the above amendment.

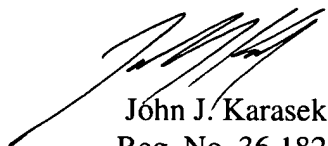
Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "Version with markings to show changes made."

Applicants hereby request a two-month period of extension. Kindly charge any additional fees due, or credit overpayment of fees, to Deposit Account No. 50-0281.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Version with markings to show changes made

In the Specification:

The Abstract has been amended as follows:

~~Doped phosphors (e.g., metal orthosilicates) are made by~~ The present invention relates to a method of preparing a multilayer phosphor (film) product on a substrate. The method comprises adding solid particulate precursor to a solution of an alkoxide precursor and a dopant precursor before hydrolysis is allowed to occur. The mixture is then allowed to hydrolyze, resulting in a sol-gel condensation reaction. The solid particulate precursor can be fumed silica, and acts as a nucleation site for the sol-gel reaction product. After the sol-gel reaction, the mixture is dried and fired to form ~~phosphors~~ a multilayer phosphor (film). The ~~phosphors~~ phosphor film ~~are~~ is especially suitable for applications in which there is low voltage operation.

The Title has been amended as follows:

METHOD FOR PREPARING EFFICIENT LOW VOLTAGE MULTILAYER
PHOSPHORS FILMS

The priority information has been amended as follows:

This is a divisional application of copending United States patent application 09/531,159, inventors Hsu et al., filed March 17, 2000, now U.S. Patent 6,402,985, the entirety of which is herein incorporated by reference.

In the Claims

The Claims have been amended as follows:

18. (Amended) A method of preparing a multilayer phosphor product on a substrate comprising the steps of:

- (a) providing a solution comprising an alkoxide precursor and a dopant precursor;
- (b) mixing said solution with a solid particle precursor;
- (c) inducing a sol-gel condensation reaction to form a sol-gel condensation reaction mixture;
- (d) spreading the sol-gel condensation reaction mixture on a substrate;
- (e) drying the sol-gel condensation reaction mixture;
- (f) repeating steps (a) through (e) (d) and (e) as needed to produce a desired thickness of film; and
- (g) heating the thick film.

28. (Amended) A method of preparing a multilayer phosphor product on a substrate comprising the steps of:

- (a) ~~(h)~~ providing a solution comprising an alkoxide precursor and a dopant precursor;
- (b) ~~(i)~~ mixing said solution with a solid particle precursor, wherein said solid particle precursor have an average particle size of from about 2 to about 10,000 nm;
- (c) ~~(j)~~ inducing a sol-gel condensation reaction to form a sol-gel condensation reaction mixture;
- (d) ~~(k)~~ spreading the sol-gel condensation reaction mixture on a substrate;
- (e) ~~(l)~~ drying the sol-gel condensation reaction mixture;
- (f) ~~(m)~~ repeating steps (a) through (e) (d) and (e) as needed to produce a desired thickness of film; and
- (g) ~~(n)~~ heating the thick film.